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NMRC Team Receives 2013 FLC Award for 'Excellence in Technology Transfer'

SILVER SPRING, Md. – During the May 23 All Hands Captain's Call, Capt. John Sanders, commanding officer of the Naval Medical Research Center (NMRC), recognized the business-legal-science team that received the Federal Laboratory Consortium (FLC) Award for Excellence in Technology Transfer for 2013. The NMRC team developed a public, private, and nonprofit partnership comprising six global organizations conducting work on three continents to advance a travelers' diarrhea vaccine. For deployed military personnel and young children living in resource-limited regions of the world, diarrhea is a very serious concern.

At the FLC regional meeting in Beltsville, Md. May 21, the NMRC team was represented by Dr. Todd

Ponzio, NMRC director, Office of Technology Transfer, and Capt. Stephen Savarino, program director for Diarrheal Diseases Prevention Research and head, *E. coli* Research Division, Enteric Diseases Department. They received the award for an adhesin-based vaccine against enterotoxigenic *Escherichia coli* (ETEC), the chief contributor to travelers' diarrhea. This technology transfer effort included licensing of key intellectual property with a large pharmaceutical company (Sanofi Pasteur) and the creation of cooperative research partnerships with this company as well as with the nonprofit organization PATH.

"It is my pleasure to recognize this team," said Sanders. "And this in-

(Continued on page 18)



Four bottles of a promising vaccine against enterotoxigenic *E. coli* (ETEC), the predominant cause of travelers' diarrhea.

NMRC Commanding Officer's Message



The broad range of our local, national and international collaborations and partnerships is captured in this issue of the newsletter. NMRC scientists and support staff are creating and maintaining numerous operational and professional relationships to support Navy Medicine's mission by creating active connections with collaborators and partners locally and around the world.

Partnering doesn't mean reducing our vigilance for relevant operational biomedical research, it means building enduring relationships based on common interests that enhance our ability to engage in research that will benefit the health and readiness of our warfighters. Sharing information on research with peers in academic and professional settings establishes networks of current and potential partners with shared interests and concerns. When our subject matter experts participate in symposiums, like the International Symposium on Aviation Psychology, they keep current on key issues and forge partnerships with colleagues who are addressing similar research. Our researchers are working jointly with the other services in many areas, like the team at NAMRU-Dayton working with the Air Force and industry on evaluating in-mask hypoxia mitigation sensors.

Global health capacity building is vitally important to our mission. For example, NAMRU-3's strong partnerships with international allies and friends in building and supporting laboratory capacity for rapid, effective disease surveillance and response is key to our infectious diseases research efforts. By recognizing the unique role played by each partner, the focus is on sharing the responsibilities and coordinating activities to rapidly and accurately detect infectious diseases of military and civilian importance. Our legal and technology transfer team is employing proven partnering tools like carefully considered cooperative research and development agreements and patent licensing agreements, and the FLC award story on the front page is a great example of our work related to the business of research.

NMRC Commanding Officer sends,
John W. Sanders III
CAPT, MC, USN



NHRC Commanding Officer's Message

As a leading research and development laboratory for the DoD, the Naval Health Research Center (NHRC) has become a critical partner to the Naval Medical Center San Diego and NAVMEDWEST for the execution of their Graduate Medical Education Program (GME) and the Clinical Investigation Program (CIP). GME/CIP are important for training residents, encouraging academic pursuits to advance medicine, as well as fostering collaboration between clinical investigators and the Navy Medicine research and development enterprise.

As influential and imperative as these programs are for accreditation, it is the outcomes of these efforts that impact our constituents and colleagues. Whether it is an assessment of a drug therapy or new surgical procedures, determining access to care and the outcomes associated with that care, designing a novel rehabilitation strategy, determining the effects of tobacco cessation programs to curbing tobacco use, or helping planners estimate the number and types of injuries expected to occur in certain environments, NHRC is proudly working side by side with NMCS D to

foster the growth of the GME/CIP while ensuring our next generation of caregivers has the proper training to be successful in their respective fields. These collaborations in research push the frontiers of science to new levels.

Military health care providers have a unique mission. Not only do they care for military members and their families, but they also must be ready to deploy and practice medicine closer to wherever a conflict may be. They also deploy on humanitarian mission.

NHRC Commanding Officer sends,
Gregory C. Utz
CAPT, MC, USN

Hospital Corps Celebrates 115th Birthday

By HMC Jerrold E. Diederich

This year we celebrate the 115th birthday of the Hospital Corps. The Navy's largest and most highly decorated rating was established by President William McKinley on June 17, 1898. From the Hospital Corps' beginning, exceptional men and women have willingly chosen to put others before themselves, exemplifying the best in our nation.

Hospital Corpsmen have been involved in every major war and conflict from the Spanish-American War to current operations in Afghanistan. Hospital Corpsmen continue to forge a legacy of dedication, heroism and compassion through their service at sea, in the air, on the battlefield and in medical treatment facilities around the world. They have also been critical to the success of

Navy medicine research and development.

Hospital Corpsmen currently support research programs throughout the world critical to the current and future success of the Navy and Marine Corps. They work as lab techs, Independent Duty Corpsmen, biomedical repair techs, and many more specialties supporting infectious disease research, the eradication of malaria, diving and undersea medicine, and in the field with mobile biological weapons detection laboratories. Their hard work and dedication have contributed to the groundbreaking achievements and life-saving discoveries throughout the history of Navy medicine research and development.

As we celebrate this month, it is important to reflect on our traditions and remember those who have given the ultimate sacrifice for freedom.



Chief Hospital Corpsman Jerrold E. Diederich, NMRC Command Chief.



HM1 Mario Espino, one of Navy Medicine R&D's exceptional Hospital Corpsmen. Photo by HM1 (SW) Vilma Bauer.

NAMRU-2 VTC Change of Command: LeBron Takes Over

HAWAII - Capt. Carlos LeBron took over the reins at the U.S. Naval Medical Research Unit No. 2 ([NAMRU-2](#)) from Acting Commanding Officer Capt. John Gilstad at a ceremony held May 10 in Pearl Harbor and broadcast via video teleconference (VTC) to Silver Spring, Edgewood and Ft. Detrick, Md.

LeBron was selected as NAMRU-2's next commanding officer in November; however, due to logistical and administrative difficulties he was delayed until May 2013. Capt. John Gilstad, Executive Officer, filled in during the three-month gap between the outgoing and the incoming commanding officers.

"This is a very special moment, not to mention a historic event, as we establish a new command in Southeast Asia," LeBron said, speaking about his most important task as commanding officer - transitioning NAMRU-2 and establishing the Naval Medical Research Center-Asia (NMRC-A).

LeBron's first duty station in the Navy was as a microbiologist with NAMRU-2, Jakarta, Indonesia, after the command was relocated from Manila, the Philippines. It is with this perspective that LeBron's remarks were made during the VTC ceremony, the second such ceremony for NAMRU-2.

"We have a great desire to bring



Capt. Carlos LeBron (left) assumes command of NAMRU-2/NMRC-A via video teleconference.

back the old days of Taipei, Manila, Jakarta, Da Nang and Guam to a great island, Singapore," LeBron said, adding that NAMRU-2 Phnom Penh will continue to function uninterrupted as the premier laboratory in Southeast Asia.

The new commanding officer comes to NAMRU-2 from his previous

tour as commanding officer of the Navy Drug Screening Lab, Jacksonville, Fla., the largest drug screening lab in the Fleet. While there, he oversaw the forensic analysis of over two million urinalysis specimens. LeBron has a Ph.D. in Food Science and Technology – Microbiology Program from Iowa State University.

San Diego Lab Focuses on West Coast GME/CIP Programs



*From NHRC
Public Affairs*

SAN DIEGO – The Naval Health Research Center ([NHRC](#)) has a specific focus on

the West Coast Graduate Medical Education (GME) Program and the Clinical Investigation Program (CIP). Capt. Gregory Utz, NHRC commanding officer, has assigned Cmdr. Thomas Herzig as the first director of

research integration.

"The Graduate Medical Education Program and the Clinical Investigation Program have existed for a number of years," said Utz. "These programs are important for training residents, encouraging academic pursuits to advance medicine, as well as fostering collaborations between clinical investigators and the Navy Medicine research and development enterprise."

Herzig will coordinate with the Clinical Investigations Department at

the Naval Medical Center San Diego to ensure physicians, scientists and residents are aware of the research opportunities affiliated with NHRC.

"From providing descriptions of the powerful databases housed at NHRC, to linking researchers with common interests, it is our charge to support and foster research interactions amongst the Navy Medicine enterprise," said Utz.

Some of the benefits of this integrated research effort include:

(Continued on page 17)

Navy Researcher Selected to Lead WRAIR Entomology Branch

SILVER SPRING, Md. – Deployed service members focus on completing their mission, but small flying and crawling things can get in their way. There are insects carrying diseases that can negatively impact the mission with a single bite, and diseases can quickly spread.

Cmdr. Daniel Szumlas is the first Naval officer to take the lead as the Chief of the Army's Entomology Branch at the Walter Reed Army Institute of Research (WRAIR). WRAIR's Entomology Branch leads the way in joint collaborations, and the selection of Szumlas to relieve Lt. Col. Richardson as the next branch chief will continue to improve the joint entomology and preventive medicine missions. The entomology programs both within and outside the continental United States collaborate extremely well, and this move will continue to strengthen the entomology research program.

"The Entomology Research Program is conducting research on tools, methods and solutions to help protect the warfighter from vector-borne diseases. We want to help ensure the readiness of military forces by reducing the risk of disease-transmitting insects and other arthropods," said Szumlas. "The services within the DoD continue to operate more and more jointly, and within the entomology community this has been one of our strengths leading to success."

The WRAIR Entomology Branch conducts basic and applied research, field testing, and product development activities to reduce the risk of vector-borne diseases to DoD personnel and to support global health. Among the diseases, malaria and leishmaniasis, transmitted by mosquitoes and sand flies, respectively, are two significant vector-borne diseases affecting U.S. military personnel.

Malaria, a preventable and treatable disease, is a blood disease caused by a parasite transmitted from human-to-human by the *Anopheles* mosquito. Malaria took its toll during several recent operations such as a Liberia peacekeeping mission in 2003, Operation Mount Thrust Afghanistan in the summer of 2006, the Benin



Cmdr. Daniel Szumlas, the first Naval officer selected to lead WRAIR's Entomology Branch.

humanitarian exercise in July 2009, and the Haiti earthquake response in 2010. Malaria is also responsible for more than 655,000 civilian deaths worldwide each year, mostly in sub-Saharan Africa.

Leishmaniasis is a parasitic disease found in parts of the tropics, subtropics, and southern Europe. Leishmaniasis is caused by infection with *Leishmania* parasites spread by the bite of infected sand flies. There are several different forms of leishmaniasis, but the most common are cutaneous leishmaniasis, which causes unsightly skin sores, and visceral leishmaniasis, which affects several internal organs and can be fatal.

Szumlas is currently in the Naval Medical Research Center's malaria department, but is also the deputy director of WRAIR's entomology research program. Previously he was the U.S. Navy entomology liaison and guest researcher at the Centers for Diseases Control and Prevention in Atlanta, where he was actively engaged in malaria control efforts in West Africa. Prior to that, he was the officer in charge of the Navy Entomology Center of Excellence, Naval Air Station Jacksonville, Fla., the premier testing and evaluation center for DoD entomological products.



An Anopheles mosquito, which spreads malaria.

Rep. Hanabusa Speaks at Asian Pacific Heritage Celebration

SILVER SPRING, Md. - U.S. Representative Colleen Hanabusa of Hawaii's First Congressional District was the guest speaker at the Walter Reed Army Institute of Research (WRAIR) and Naval Medical Research Center (NMRC) Asian Pacific American Heritage Month celebration, May 13.

The event, which paid tribute to the late Senator Daniel K. Inouye, was held in the building named after the Senator in honor of his unwavering support of military medical research.

"I am moved seeing Senator Inouye's name on this state-of-the-art facility. It is a fitting tribute. He stood

as its advocate because he knew from experience the importance of quality medicine and quality research. He believed the care he received in military hospitals saved his life, and he worked tirelessly throughout his career to give back in any way he could," said Hanabusa.

On April 21, 1945, Inouye was grievously wounded while leading an assault on a heavily defended ridge near San Terenzio in Tuscany, Italy, during World War II. The ridge served as a strongpoint along the strip of German fortifications. Inouye later received the Medal of Honor from President Bill Clinton. Inouye passed away December 17, 2012.

"It was an honor to meet with the men and women of WRAIR and the Naval Medical Research Center to learn more about the critical research they are doing to protect the health of our Armed Service members. Their hard work not only contributes to the United States' military readiness, but it also serves a diplomatic purpose by positioning our nation as a global leader in biomedical research and development. I would like to say mahalo to the WRAIR and NMRC leadership for inviting me to speak at their event, and I look forward to working with them in the future," said Hanabusa, member of the House Armed Services Committee.



From left: Rear Adm. Bruce Doll, Deputy Chief, Commander of Navy Medicine Research and Development; Col. Peter Weina, Deputy Commander, WRAIR; and U.S. Representative Colleen Hanabusa of Hawaii's First Congressional District pause for a moment to read about the late Senator Daniel K. Inouye and his contributions to military medical research. Photo by David Miles, WRAIR.

Military Researchers Evaluate In-Mask Hypoxia Mitigation Sensors

By Dr. Jeffrey Phillips and Dr. Bill Becker, NAMRU-Dayton



DAYTON, Ohio - Hypoxia represents a significant hazard in military and civil aviation. Since 2001, over one hundred hypoxia-

related hazard reports and three mishaps in Naval aviation have been attributed to hypoxia.

Scientists and engineers at the Naval Medical Research Unit Dayton ([NAMRU-Dayton](#)) are testing in-cockpit hypoxia detection methods focusing on physiological sensors including pulse oximetry, reflectance oximetry, and near-infrared spectroscopy. Although each of these techniques is capable of detecting a hypoxic event, their functionality is often compromised by environmental factors and require the operator to experience a significant degree of blood oxygen desaturation before hypoxia is detected.

These limitations led NAMRU-Dayton investigators to seek hypoxia detection methods that would rapidly alert the operator to the onset of a hypoxic event.

One promising approach uses gas sensors to monitor the volume and quality of air provided to pilots and crew through their life support systems. Researchers determined that in the event of a hypoxic episode an oxygen sensor in the mask would detect hypoxia up to six minutes before any of the measures of blood oxygen saturation would.

These promising results have led to a collaboration between the Navy, Air Force, and private industry. An industry partner developed a sensor suite to detect any disruption in the quantity or quality of the breathing air supplied to the pilot. The suite is composed of an oxygen and flow sensor to test air before it reaches the operator as well as a carbon



The orbital hypoxia mitigation sensor suite mounted to a standard aviation mask.

dioxide sensor to check for anomalies in expired air to suggest a disruption to normal respiratory metabolism.

NAMRU-Dayton researchers are working on a project, funded through the Air Force Surgeon General's Office, to characterize the effect of normal aerospace environmental factors on sensor performance and accuracy.

Many aspects of the aviation environment, such as fluctuating barometric pressures and humidity levels as well as temperature extremes, can negatively influence sensor performance in operational settings.

These sensors are evaluated inside a hypobaric chamber while temperature, pressure, flow and

humidity are manipulated. The results will be used to establish algorithms to correct for the negative effects of aviation-specific environmental issues.

NAMRU-Dayton researchers and their research collaborators will continue investigating this and other potential mitigations with the constant goal to improve the safety of flight for our warfighters.

NAMRU-Dayton conducts research in the areas of acceleration effects, aviation medical standards and personnel selection, physiological and cognitive effects of altitude, vision research, pulmonary health effects, neurotoxicology, neurobehavior, reproductive health and systems biology.

NAMRU-3 Commanding Officer Visits Collaborators in Beheira

From NAMRU-3 Public Affairs

CAIRO – The U.S. Naval Medical Research Unit No. 3 ([NAMRU-3](#)) has a long history of collaboration with the Ministry of Health in the Egyptian governorate of Beheira, beginning in 1995. NAMRU-3 started its activities there with a health utilization survey and laboratory renovations, which has been a continuous process and includes three rooms added to the laboratory there for polymerase chain reaction (PCR) and tuberculosis testing.

NAMRU-3's Global Disease and Detection Program and the Bacterial Disease and Protection Program are currently working with hospitals, clinics and laboratories in the city of Damanhour, which is about two hours'

drive from Cairo.

Capt. Buhari Oyofo, NAMRU-3's commanding officer, visited for an update on collaborative efforts, April 29.

"Whatever we do, there is more we can do, more research and more capacity building." - Capt. Buhari Oyofo, NAMRU-3 commanding officer.

At the end of the visit, Capt. Oyofo commented, "Whatever we do, there is more we can do, more research and more capacity building."

NAMRU-3's researchers are working in the regional laboratory of the Damanhour Central Public Health Laboratory, sharing offices with ministry of health and Centers for Disease Control and Prevention staff.

Key NAMRU-3 medical researchers Dr. Adel Mansour and Dr. Hoda Mansour are working in Damanhour. Adel Mansour is the International Emerging Infections Program site

coordinator and Hoda Mansour is the laboratory director.

Adel Mansour said, "There are many advantages to doing research in this part of Egypt, because Beheira contains communities of fishermen, bedouins, farmers and industrial workers."

During the commanding officer's visit, Adel Mansour introduced Oyofo to key ministry of health staff. Oyofo had an extensive tour of ministry of health offices, the laboratory and a local hospital. He met with Dr. Mohamed Nematullah, the first undersecretary to the Minister of Health, who emphasized that collaboration, especially training and improving health care staff capacity building, was a Ministry of Health priority.

At a local teaching hospital, Oyofo met with the director, who discussed the need for training and increased laboratory capabilities. Oyofo also met with the CDC's International Emerging Infections Program surveillance team, who told him what they do in a normal day of surveillance activities. The final stop was the pediatric intensive care unit, where physicians presented cases and suggested areas of potential collaboration between the hospital and NAMRU-3.

Next Oyofo returned to the regional lab, where local staff discussed data management. He also visited the PCR and media rooms. Oyofo next spoke with the Ministry of Health site coordinator, who discussed how the ministry and NAMRU-3 work as a team on training activities, reaching over 100 health care professionals.



From left: Dr. Adel Mansour, NAMRU-3 international emerging infections program site coordinator; Dr. Nahed Azzazy, Egyptian Ministry of Health; Capt. Oyofo, NAMRU-3 commanding officer; Dr. Rabab, IEIP physician. Rabab discusses surveillance and enrollment at Damanhour Training Hospital.

Dayton Expands Collaboration, Capability for Fatigue Research

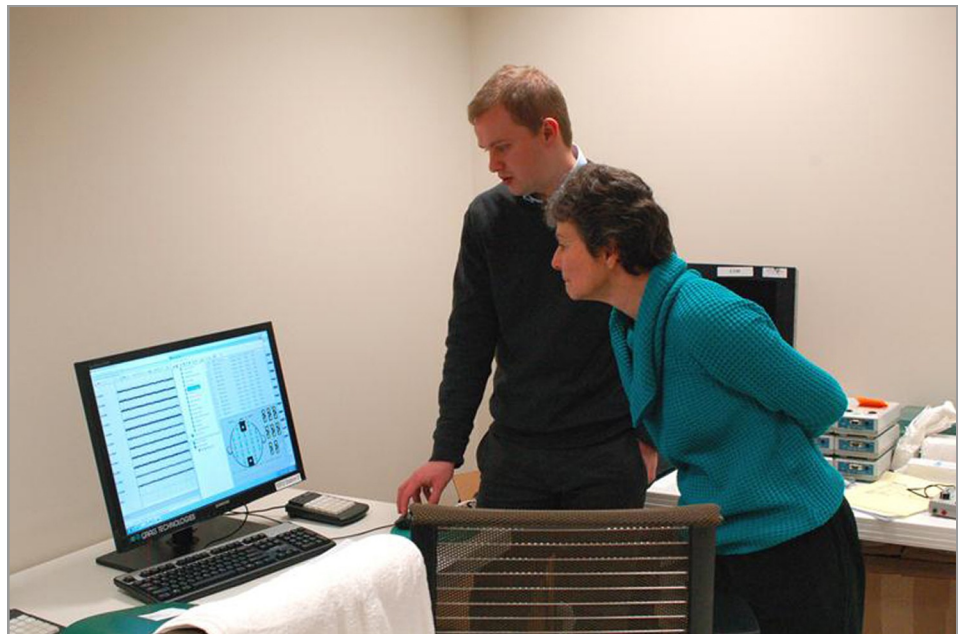
By Dr. Lynn Caldwell, NAMRU-Dayton

DAYTON, Ohio - One of the major goals in moving the Navy's aeromedical research function from Pensacola, Fla. to Wright-Patterson Air Force Base was to allow opportunities for growth and collaboration with other research laboratories.

This goal is coming closer with the Air Force-funded study to investigate the combined effects of caffeine and modafinil, the military's prescription alertness-enhancing medication.

Scientists from the Naval Medical Research Unit Dayton ([NAMRU-Dayton](#)), the U.S. Air Force School of Aviation Medicine (USAF SAM), and the Christchurch Neurotechnology Research Programme, based in the New Zealand Brain Research Institute, have come together to explore the effects of combining multiple alertness aids on various measures of physical and cognitive performance.

As the lead in this research effort, NAMRU-Dayton performs various cognitive tests as well as measurements of brain activity using



Dr. Slaval Guznov (left) and Dr. Lynn Caldwell (right) analyze the measures of physical and cognitive performance of the research volunteer's wake EEG activity on the polysomnographic system.

a newly acquired polysomnographic system.

Recording of the sleep electroencephalographic (EEG) will allow scientists to determine stages of sleep during overnight sleep recordings and document the quality

of sleep. This system has the capability of recording wake EEG activity and processing the data through spectral analysis. The outcome of this EEG analysis during a cognitive task permits scientists to correlate performance with brain activity and eventually predict when a person is too sleepy to perform a task successfully.

Researchers of the New Zealand Brain Research Institute are measuring behavioral lapses in attention. Combining performance on a tracking task with eye movement and EEG activity provides data that reliably detect lapses in attention and signal when a person is no longer able to stay awake and perform the task at hand.

Dr. James Gaska of USAF SAM and Lt. Cmdr. Hong Gao of NAMRU-Dayton are measuring changes in depth perception as a person becomes sleepy.

Through this joint research effort, questions concerning the safety and efficacy of combining prescribed and over-the-counter stimulants can be documented.



Chelsea Sill (right) prepares the tracking task. EEG activity is recorded during the task and processed through spectral analysis, which can detect the research volunteer's lapses in attention.

Researcher Presents at West Africa Malaria Task Force Meeting

From NAMRU-3 Public Affairs

CAIRO - Lt. Cmdr. Samuel Levin of the U.S. Naval Medical Research Unit No. 3 (NAMRU-3) gave a presentation on the laboratory's capabilities and projects while participating in the West Africa Malaria Task Force Meeting in Ghana, April 25.

"It was an honor to give a presentation and attend such important meetings on the 25th of April, which is the World Health Organization's World Malaria Day," said Levin.

His presentation was part of a three-day event sponsored by the U.S. Africa Command (AFRICOM), with U.S. representatives along with experts in malaria programs and representatives of military medical services from eight nations of the Economic Community of West African States (ECOWAS). The intent of the meeting was to discuss and share military malaria program gaps in these countries.

In support of the U.S. President's Malaria Initiative (PMI), this meeting advanced military-to-military and civilian-to-military cooperation with African partner countries. It was also an important step in keeping U.S. forces on the ground in West Africa healthy.

"This meeting allowed us to get to know our partners and what their current surveillance and treatment activities are," said Levin.



From left: Capt. David Weiss, MC, USN, Command Surgeon, AFRICOM; Air Commodore Olufeye of the Nigerian Defense Force; and Lt. Cmdr. Samuel Levin, NAMRU-3. Photos by Refaat Hanna, AFRICOM.

For Levin, among the most interesting discussions were those involving the attending militaries and their experiences with deployments outside their home countries. They discussed shared interests, not only among themselves, but also with the U.S. military, on proper personal protective equipment and its use, chemoprophylaxis compliance, and knowledge gaps of the "boots on the ground" on the causes and preventive measures for

malaria.

"We all have common issues and often know how to resolve them. This meeting allowed us to come together and share our problems and solutions, forging a path forward to decreasing the impact of malaria on both the host nation militaries and their civilian populations," Levin said.

NAMRU-3 is a World Health Organization reference laboratory for malaria, providing expertise in identification, speciation, differentiation of reinfection and recrudescence, and determination of mechanisms of malarial parasite drug resistance. NAMRU-3 also has a detachment in Accra, Ghana, located at the Noguchi Memorial Institute of Medical Research, and researchers are working in collaboration with the Ghanaian Ministry of Health.

Levin said, "Ghana has the most complete malaria program in West Africa."

Recent malaria studies at NAMRU-3 include a phase one dosage escalation study of the safety and immunogenicity of EBA-175 R-II malaria vaccine and the characterization of molecular markers of drug resistance of *Plasmodium falciparum*, the protozoa parasite that causes malaria.



Group photo of West Africa Malaria Task Force partners.

International Flight Surgeons Tour Naval Medical Research Unit Dayton

By Dr. Richard Arnold

DAYTON, Ohio - Since the establishment of the Naval Medical Research Unit Dayton ([NAMRU-Dayton](#)) in 2010 as part of the Maj. Gen. Harry G. Armstrong Center for Aerospace Medicine at Wright-Patterson Air Force Base, Ohio, Navy researchers have established close partnerships with their local Air Force counterparts.

A recent example is NAMRU-Dayton's hosted visit by a group of international flight surgeons who were aboard Wright-Patt attending the Advanced Aerospace Medicine for International Medical Officers (AAMIMO) course at the U.S. Air Force School of Aerospace Medicine.

Tours of the NAMRU-Dayton aeromedical facilities were provided to USAF and AAMIMO students. Among the tour stops, Dr. Henry Williams demonstrated a prototype simulation-based trainer to provide spatial disorientation familiarization to pilots, Dr. Joseph Chandler discussed recent research on the efficacy of intranasally delivered



Lt. Cmdr. Will Wells (right) discusses the Vertical Linear Accelerator with a group of international flight surgeons during a tour of NAMRU-Dayton.

scopolamine as a motion sickness countermeasure, Dr. Jeff Phillips discussed his research on physiologic sensor technologies for in-cockpit hypoxia detection, and Lt.

Cmdr. Will Wells demonstrated the capabilities of the NAMRU-Dayton Vertical Linear Accelerator for conducting research on rotary wing vibration effects.

New Clinical Trial Data System Supports Army/Navy Collaboration

BETHESDA, Md. – Navy and Army researchers conduct collaborative clinical trials at the Naval Medical Research Center ([NMRC](#)) Clinical Trials Center on the Walter Reed National Military Medical Center campus and at other affiliated facilities. A recent joint effort, over two years in the making, in clinical trials records keeping is benefiting both services.

"The EDC [Electronic Data Capture] working group, a group of collaborative Army and Navy commands, successfully deployed a new clinical trial data system," said Carlos S. Vasquez, the NMRC Clinical Trials Center data manager. "The Navy's IMRAS clinical trial, led by Lt. Cmdr Brad Hickey, the principal investigator from the Naval Medical Research Center in Silver Spring, Md., is the

sentinel study for the approval of the new data capture system."

IMRAS (Immunization via Mosquito Bite with Radiation-attenuated *Plasmodium falciparum* Sporozoites) is a phase 1 clinical study that is designed to assess the safety and biomarkers of protection in healthy malaria-naïve adults, who will receive bites from *Anopheles stephensi* mosquitoes infected with radiation-attenuated malaria. It is expected that the results of this study will accelerate the development of a malaria vaccine.

IMRAS was chosen to be the sentinel study due to the study start time and because it is a model of collaborative scientific effort between NMRC and the U.S. Army Medical Research and Materiel Command (USAMRMC).

The new Electronic Data Capture-Clinical Research Data Management System (EDC-CRDMS) utilizes several Oracle commercial off-the-shelf products and allows researchers to more efficiently develop, conduct and manage electronic data capture-based clinical trials. Using the software, researchers are able to accelerate trial development, increase trial efficiency, and more readily share clinical data with external partners, collaborators, and the Food and Drug Administration (FDA).

"The EDC will ensure greater data integrity and will allow for easier data sharing with our colleagues" Vasquez said.

"This is a huge accomplishment," said Deputy Project Manager and EDC Working Group co-chair Army ([Continued on page 18](#))

NMRC Researcher Participates in Virtual Grand Rounds Symposium

SILVER SPRING, Md. – Lt. Rebecca L. Pavlicek, division director for bacteriology in the Naval Medical Research Center's (NMRC) Wound Infections Department, participated in the DoD Connect Joint Combat Casualty Research Team's Grand Rounds Symposium: *Wounds, Bugs, Drugs and Hugs* for the Role 3 medical facilities in Kandahar, May 31. The attendees were tri-service military physicians from diverse specialty areas and included U.S. military personnel as well as Australian, British, Danish and Romanian physicians.

Addressing the audience, Pavlicek began by saying, "The incredible strides many of you have made in the medical field have tipped the scale on warfighters surviving initial trauma. You have demanded so much of yourselves, so there is no reason you can't demand more of your researchers."

She pointed out that new antimicrobials are needed to prevent and treat multi-drug resistant bacterial infections. Pavlicek's presentation highlighted current NMRC research focused on the next generation of wound care, which includes bacteriophage and photodynamic therapy. The team is evaluating multiple quantitative and qualitative endpoints throughout the course of treatment for aggressive wound infections.

"Bacteriophage are basically predators of bacteria. They are the number one threat to bacteria in the natural environment and are very abundant," said Pavlicek. "In collaboration with our Army counterparts, we developed a neutropenic wound model that can allow in-depth study of possible treatments."

The primary focus of the team is to develop and evaluate treatment and prevention strategies for skin and soft tissue infections associated with multidrug-resistant organisms. Pavlicek is also working in close collaboration



Lt. Rebecca Pavlicek in her office at NMRC. Photo by David Miles, WRAIR.

with healthcare providers at the Walter Reed National Military Medicine Center in Bethesda, Md. to quickly identify pathogens infecting warfighters' wounds with the goal of developing and testing novel wound therapies.

"What if we could redesign bacteriophage to target any bacterial strain and deliver a deadly antimicrobial load to the bacteria or deliver a therapeutic agent to the cells? We are not quite there yet, but the research is marching along," said Pavlicek. "We have established some great industry collaborations to study these possibilities."

She also discussed other research efforts using nanoparticles and photodynamic therapy.

"When we take silver nanoparticles, silver is already antimicrobial, and coat them with photosensitizers, then expose them to specific wavelengths of light, we can increase microbial killing by up to ten times of what is seen with an agent alone," Pavlicek said. "Results are very promising. We have many great possibilities on the horizon, but we still have a lot of work to do."

NMRC's Wound Infections Department was established in 2011 in response to the Navy Surgeon General's call for research that will provide direct benefit to wounded warfighters. Wound infections are often difficult and costly to treat, both in the hospital and during prolonged care, and also have significant impact on military readiness. Considering the total combat-injured population, the successful use of these therapeutic approaches may translate to better medical care and significant cost savings.



Participants of the DoD Connect Joint Combat Casualty Research Team's Grand Rounds Symposium: Wounds, Bugs, Drugs and Hugs viewing a virtual presentation.

NAMRU-Dayton Contributes to Symposium on Aviation Psychology

From NAMRU-Dayton Public Affairs

DAYTON, Ohio. – Presenting the latest research on human performance problems, creating safe and efficient aviation design solutions and bridging the gap between research and application were the goals of the 17th International Symposium on Aviation Psychology (ISAP).

The Naval Medical Research Unit Dayton ([NAMRU-Dayton](#)) contributed to the May 6-10 meeting with on-site laboratory tours and three scientific presentations at neighboring Wright State University.

Over 300 U.S. and international aviation psychologists from academia, government and industry attended the biennial conference.

Laboratory tours at Wright-Patterson Air Force Base were part of the program and included stops in several NAMRU-Dayton labs. Visiting scientists were briefed on NAMRU-Dayton's hypoxia sensors, hypoxia effects, neuro-otologic testing center, fatigue countermeasures, disorientation research device, and spatial disorientation training

programs. Visitors expressed great interest in the work being done at NAMRU-Dayton, and several new explorations of collaborative research are underway.

Dr. Richard Arnold, NAMRU-Dayton aeromedical research director, has served on the ISAP organizing committee since 2011. When asked about ISAP's benefits for Navy medicine research and development, he said, "The ISAP community represents a great repository of expertise and experience in cockpit human factors and human performance research.

"As a result of the collaborative relationships developed and strengthened through venues such as ISAP, NAMRU-Dayton, and ultimately naval aviation, will benefit through better identification of promising technologies and scientific approaches for supporting the health, safety, and performance of Naval pilots and aircrew."

During the Unmanned Aircraft Systems: Model and Training session at the university, Arnold gave a presentation that he coauthored with Cmdr. Joseph V. Cohn, Office of

Naval Research; Lt. Cmdr. Brent A. Olde, Naval Air Station Patuxent River; and Ms. Elizabeth B. O'Neill, Strategic Analysis, Inc.

In a Visual/Ocular Indices in Flight session, Dr. Fred Patterson (NAMRU-Dayton) presented Visual Perspective Illusions as Aviation Mishaps Causal Factors, which highlighted ongoing research to reproduce specific visual illusions common in the flight environment. The goal of this research is to develop and validate training materials to provide pilots the means to identify and avoid several of the most prevalent visual perspective illusions experienced in flight. Arnold and Dr. Henry Williams, Deputy Director of Aeromedical Research at NAMRU-Dayton, were authors on the study as well.

Dr. Matthew Funke represented NAMRU-Dayton and his former Air Force affiliation with previously completed research done with the Air Force at Wright-Patterson AFB. He presented Cognitive Evaluation of Stimulus Significance during Vigilance Task Performance Using Cerebral Bloodflow Velocity.



The Environmental Health Effects Directorate building at NAMRU-Dayton, Wright-Patterson Air Force Base.

NMRC Participates in Spring Research Festival at Fort Detrick

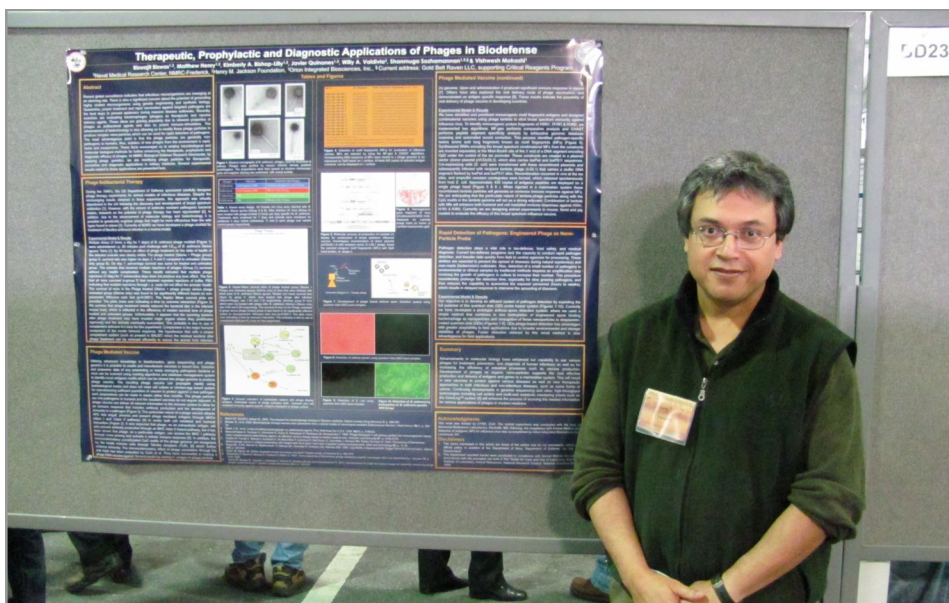
SILVER SPRING, Md. – Representatives of the Naval Medical Research Center (NMRC) participated in the 17th Spring Research Festival, hosted for the first time this year by the National Interagency Confederation for Biological Research (NICBR) at Fort Detrick, Frederick, Md., May 8-9. The research festival was previously jointly hosted by the NCI-Frederick and Ft. Detrick. NICBR is a consortium of eight Federal agencies, including NMRC, engaged in biological research.

The goal of the festival was to acquaint the community – scientists, citizens, and especially students – with the agencies' diverse research efforts. Volunteers from NMRC's Biological Defense Research Directorate, which is located at Ft. Detrick, set up an information booth in the NICBR Alley tent to showcase work being done at that lab.

Students, technical support staff, postdoctoral fellows and principal investigators presented nearly 150 posters describing their work. In addition to the scientific poster sessions, the festival included a health and safety exposition, educational information, safety and scientific displays, and commercial exhibits of the latest scientific equipment and technologies.

NMRC is part of the NICBR, along with other federal and DoD agencies that include the U.S. Army Medical Research and Materiel Command, Department of Homeland Security, Centers for Disease Control and Prevention, National Cancer Institute, National Institute of Allergy and Infectious Diseases, U.S. Department of Agriculture, and the Food and Drug Administration.

NICBR members have distinct research missions and complementary capabilities. NICBR serves as a framework for facilitating and encouraging interaction among the member organizations where there are areas of mutual interest. Members cooperate across scientific disciplines, engaging in collaborations and sharing of technical expertise as well as scientific services and effective management practices.



Dr. Biswajit Biswas, NMRC senior scientist. Poster title: Therapeutic, prophylactic and diagnostic applications of phages in bio-defense. Dr. Biswas' poster presentation discussed the use of bacteriophages (phages) to develop novel ways to treat infectious diseases and more accurate and specific diagnostic platforms. As a proof of concept, he has developed a cocktail of six phages targeted against Bacillus anthracis as an alternative therapy for antibiotics. Preliminary animal work demonstrated the rescue of mice with acute bacteremia due to these select agents.



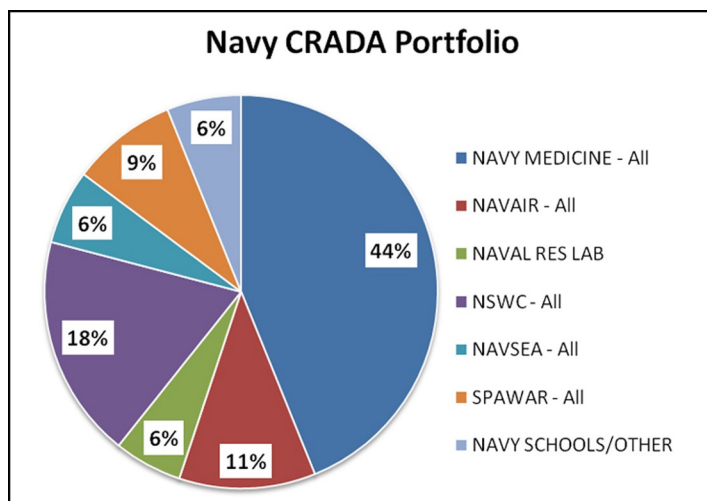
From left: Advanced laboratory technicians HM1 Mark Salvador and HM1 (SW) Vilma Bauer. Along with Dr. Ketan Patel, Maria Charlier, and Matthew Bain, Salvador and Bauer volunteered to support the NMRC information booth at the Spring Research Festival at Ft. Detrick, Md.

Mice that Roar - Navy Medicine Tops Navy's CRADA Portfolio

By Todd Ponzio, NMRC Director, Office of Technology Transfer

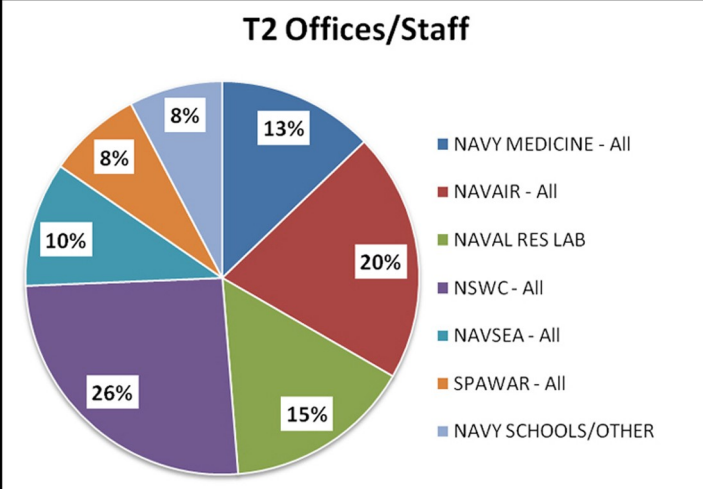
SILVER SPRING, Md. - Staring awestruck at one of the Navy's impressive vessels, one might naturally consider the amount of toil and time—not to mention steel—that went into its assembly. With those efforts in mind, one might think that the bulk of the Navy's Cooperative Research and Development Agreements (CRADAs) relate to these extraordinary craft. After all, fielding superior military capabilities is the foundation for achieving successful missions, and most of the Navy's laboratories focus on engineering watercraft, aircraft or weaponry.

But the largest contributor to the Navy's CRADA and technology transfer portfolio is Navy Medicine. This is the case in terms of both raw numbers as well as dollars. Navy Medicine accounts for over a third of the entire Navy CRADA portfolio. There are twenty-odd technology transfer offices covering the Navy laboratories; Navy Medicine has three. Those three offices are housed at the Naval Medical



significant. Normally in the biomedical realm, there are often worldwide markets for beneficial health products. Larger markets attract more players, and more players lead to more collaborations. The markets are smaller for research products involving weapons or craft. Though every corner has a pharmacy where you can grab your medications, good luck finding a place to buy a torpedo.

Within Navy Medicine, we too are product focused. However, an adequate market is far from a foregone conclusion for the indications and diseases being researched within Navy Medicine, and so partnerships focused on rare, militarily relevant diseases (which may not have much of a market) can be a challenge. This challenge, though, can be met through creativity, market segmentation, and sophisticated data analysis, making the Navy Medicine portfolio and associated researchers all the more remarkable. The dynamic scientists throughout Navy Medicine routinely collaborate with various institutions, moving their research findings ever closer to commercial translation, and the massive CRADA portfolio within Navy Medicine is a testament to their inventiveness, resourcefulness and devotion. And this is something just as impressive as a gigantic new steel battleship.

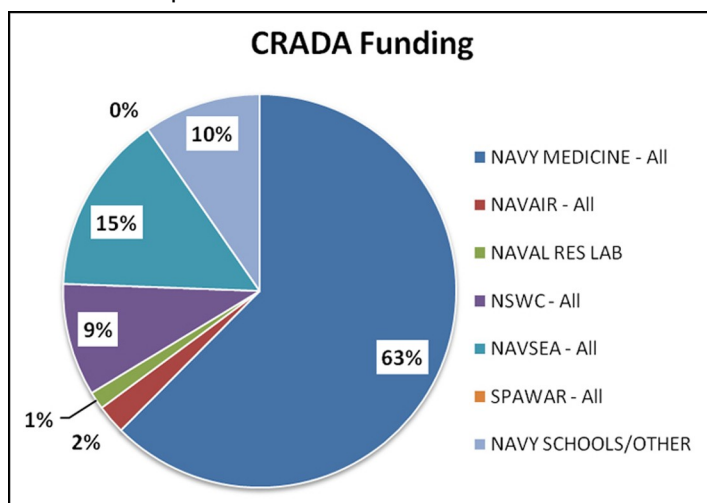


Research Center (NMRC) as well as the Naval Medical Centers - San Diego and Portsmouth (NMCS and NMCP), with NMRC taking the lead.

How is it that Navy Medicine's three offices can contribute the biggest chunk of the Navy's CRADA portfolio? There are two main reasons: (1) the nature of the research, and (2) the commercial market for the product.

First, biomedical research is exceptionally collaborative and ubiquitous. Universities are a case in point; although engineering programs are found intermittently, all colleges have a biology department. Also, unique reagents such as plasmids, antibodies, vectors, etc. are commonly/ collaboratively shared rather than guarded. Furthermore, there are far more journals in the biomedical field than in fields such as chemistry, engineering or physics. Not only is there a high number of researchers in the field, those individuals are generous and highly productive.

Second, the commercial applicability of the ultimate fruits of the research endeavors, the resulting products, can be



Sailors Visit San Antonio Middle School's First Career Day

By Joe N. Wiggins, Public Affairs, Naval Medical Research Unit San Antonio

SAN ANTONIO – In an inner-city school striving to introduce students to a research-based and data-driven curriculum, several Navy officers participated in the first Career Day to show students how far education can take them.

Officers from the Naval Medical Research Unit San Antonio ([NAMRU-SA](#)), Navy Medicine Education and Training Command (NMETC) and Navy Medicine Training Support Center (NMTSC) participated in the event at the Joel C. Harris Academy. The middle school focuses on a science, math and technology-based curriculum.

The four officers made their training, education and experiences in the Navy relevant for the young audience. Lt. Cmdr. Linh H. Quach, a pharmacist with the DoD PharmacoEconomic Center, shared how his past experiences and training help him perform his job as well as see some of the humor in his daily responsibilities.

"I'm the link between a patient and their doctor as a pharmacist, helping to make sure they get the right medicines and exactly what the doctor prescribed," he said. "Have you ever tried to read a doctor's handwriting?"

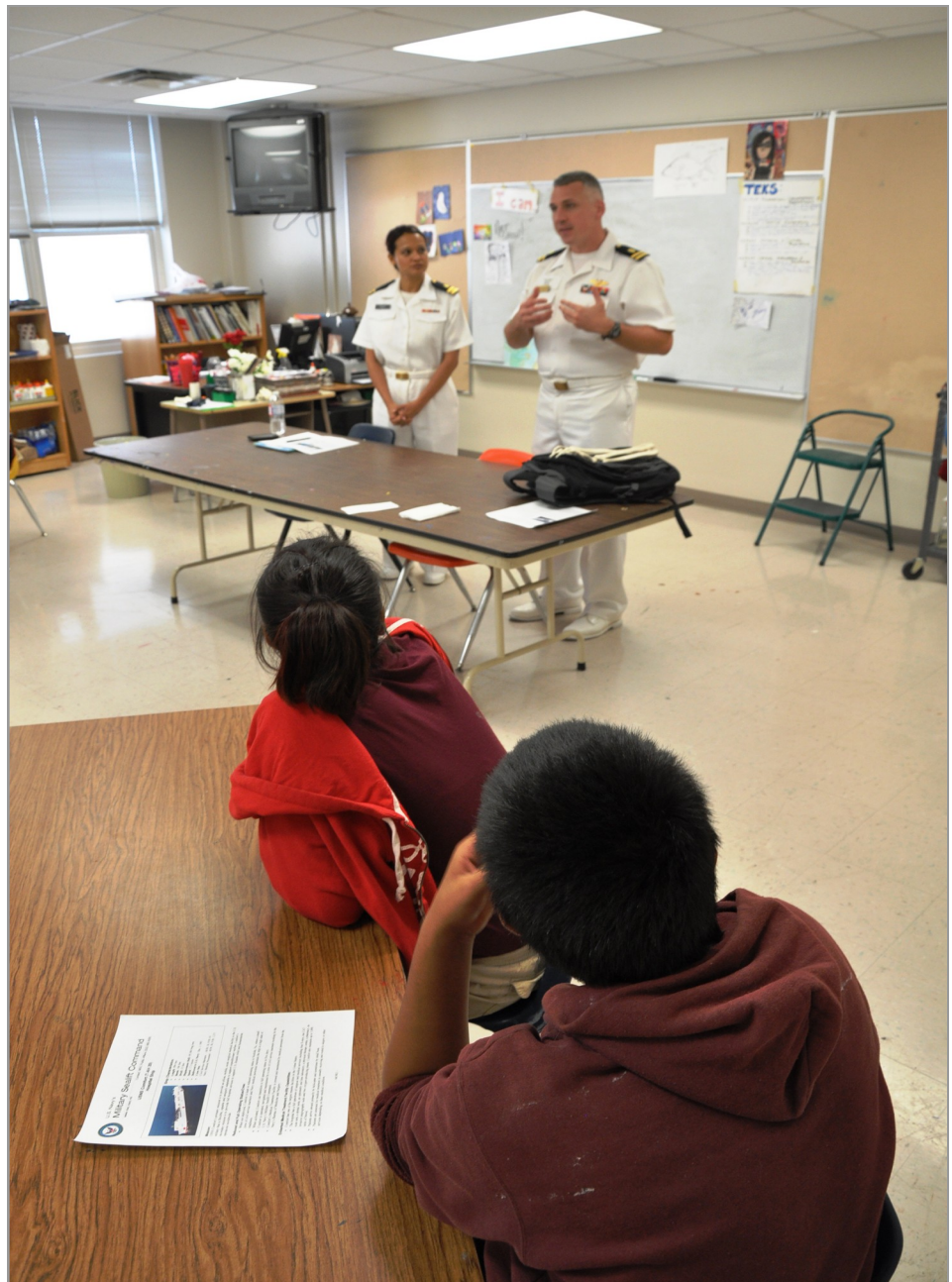
The classroom of approximately 25 students immediately burst out laughing.

While the program was aimed at benefitting the students, the officers also came away rewarded from the experience.

"I represented my command as a part of the science, technology, engineering and mathematics initiative program. I hope my visit inspired the students to acquire higher education, to become responsible citizens and to take pride in our service members," said Lt. Saima Raza, a research psychologist with NAMRU-SA.

The teachers agreed the program met their expectations.

"This is my first Career Day here at Joel C. Harris Academy. It seems to really be opening the kids up to new opportunities they have not been exposed to before today," said Carol



Lt. Saima Raza (left), a research psychologist with NAMRU-SA, and Lt. Daniel J. Houlihan (right), an occupational therapist with NMETC, spoke with a group of middle school students at the Joel C. Harris Academy in San Antonio.

Barnes, a math teacher at the school. "Some are very sheltered because of the inner-city economy, so having Navy officers come in and talk to the students is a great thing for us."

Also meeting and mentoring students were Lt. Vanita J. Williams, a nurse with NMTSC, and Lt. Daniel J. Houlihan, an occupational therapist with

NMETC. The officers related their experiences in the Navy and answered several questions during their visit.

When asked whether she would come back again given the opportunity, one officer was clear. "If given an opportunity, I would like to visit again and involve young scientists in ongoing projects at our command," said Raza.

NMRC Personnel, Families Attend Marine Barracks Evening Parade

By Lt. Brian Pike, NMRC

WASHINGTON, D.C. - The Naval Medical Research Center (NMRC) is fortunate to be located in our national capital region. This affords our military personnel, government employees and contractors unique opportunities to take in the sights that Washington, D.C. has to offer. Among them, our nation's capital has many well-known military-oriented attractions such as Arlington National Cemetery and the U.S. Navy Memorial as well as the Vietnam, Korean, and WWII War Memorials. Last month, NMRC personnel and their families seized the opportunity to witness a military tradition steeped in history that is unique to the D.C. area.

Founded in 1801 by President Thomas Jefferson and Lt. Col. William Ward Burrows, the third commandant of the Marine Corps, the Marine Barracks in Washington, D.C., also known as "8th and I," is the oldest active post in the Corps. The Barracks is home to many nationally recognized units, including the Marine Corps Silent Drill Platoon, the Marine Drum and Bugle Corps, the Marine Band, the official Marine Corps Color Guard, and the Marine Corps Body Bearers. The site has also been the home of every Marine Corps commandant since the commandant's living quarters were completed in 1806.



Marines on parade at the Marine Barracks in Washington, D.C. Photo by Sgt. Dengrier M. Baez.

Both the Home of the Commandant and the Barracks are registered national historic landmarks.

Since its founding, the Marine Barracks in Washington has hosted many military reviews and ceremonies. Since July 5, 1957, these ceremonies have included an evening parade held weekly during the summer months. NMRC personnel and their families had the pleasure of viewing this spectacle May 17. The

event included a brief history of the Marine Barracks, performances by the Marine Band as well as the Marine Drum and Bugle Corps, and a parade of the Corps Silent Drill Platoon.

If you missed the opportunity to see the performance, reservations are free and the parade is scheduled to occur every Friday through August 3. For more information, visit: <http://www.barracks.marines.mil/Parades/GeneralInformation.aspx>.

San Diego Laboratory to Lead West Coast GME/CIP Programs

(Continued from [page 4](#))

- Assist academic staffs and residents or fellows with short- or long-term support for potential research projects.
- Allow residents or fellows to directly insert into ongoing research protocols to expeditiously begin academic research requirements for the GME program.
- Provide background reviews, data collection, statistical analyses and summary reporting while residents gain experience by being directly involved in ongoing research

protocols.

- Use limited research and development funds more efficiently to help innovate clinical therapies.

Clinical investigations focus on research into clinical health problems for any condition of concern in providing healthcare to service members and their families. It is DoD policy that clinical investigations are an essential component of medical care and teaching intended to achieve improved quality of care for patients, support graduate medical education programs, and generate an

atmosphere of inquiry in the GME programs responsive to the dynamic nature of the health sciences.

NHRC works closely with operational units by conducting medical modeling and simulation analysis monitoring the effects of combat exposure on psychological health, managing career-span deployment health and readiness programs, improving warfighter performance, and assisting in the implementation of military-specific HIV prevention programs around the world.

NMRC Team Receives 2013 FLC Award for ETEC Vaccine

(Continued from [page 1](#))

cludes everyone who worked diligently to put these agreements into practice over the past few years.”

Sanders congratulated everyone from the scientific team, to those who spearheaded the development and prosecution of patent applications, to the original negotiation team and all those who made important contribu-

tions to this effort.

The intellectual property resulting from the effort includes patents pending in the United States, Canada, Australia, Japan, and the European Patent Office.

“Together with his excellent team and partners, Savarino is at the cusp of a commercialized product for the benefit of the warfighter, the U.S.

public, and the developing world,” said Ponzio. “Products such as these are the reason federal laboratories exist, and it is an honor to be associated with the scientific, business and legal team involved in these efforts.”

An exemplary model for inventor involvement throughout the technology transfer process, Savarino, with more than 25 years as an innovative researcher, spearheaded the effort from the original scientific discovery to industry outreach. He continues to be involved in the process to further develop and commercialize the vaccine.

“The course of history has been altered many times over when superior military forces succumbed to widespread gastrointestinal infection. Even today, more than 70 percent of American warfighters experience travelers’ diarrhea,” said Savarino. “Sadly, the outcome of future generations is also greatly altered by the death of 1.6 million children each year due to acute gastroenteritis.”

Each year the FLC recognizes individuals and groups in federal laboratories whose accomplishments exemplified the goals and ideals of innovation and technology transfer to the betterment of the U.S. and international community. The FLC awards are a prestigious honor in the technology transfer world, with dozens of federal laboratories submitting nominations each year. These awards are a source of great pride for both the laboratories and their government agencies, as they indicate a translational return on investment for the taxpayer.



NMRC commanding officer, Capt. John Sanders, recognizes the business-legal-science team that received the Federal Laboratory Consortium (FLC) Award for excellence in Technology Transfer for 2013. Some of the team pictured here with Sanders: Capt. Stephen Savarino, Dr. Todd Ponzio, Dr. Albert Churilla, Lt. Cmdr. Michael Gregory, and Ms. Leslie Gunn-Jordan.

New Clinical Trial Data System Supports Army/Navy Collaboration

(Continued from [page 11](#))

Capt. Bruce Barnes. “EDC will allow clinical trials at USAMRMC to be stored electronically, which allows for easier reporting, input and data management.”

The EDC project became fully operational April 22, 2013.

“I am proud of being a part of this productive and successful collabora-

tive effort between so many USAMRMC organizations and the Naval Medical Research Center,” said Army Maj. Kirsten Smith, director of the Clinical Support Services Division and co-chair of the EDC Working Group. “Obtaining, configuring, and fielding this capability will provide a valuable resource to our product development teams, external partners,

and the DoD for years to come.”

The NMRC Clinical Trials Center conducts outpatient clinical trials, supports collaborative medical treatment facility clinical trials, and provides limited regulatory support for Phase 1 and Phase 2a studies. The center is a translational research gateway that links the clinical side with the research and development side.

U.S. Government Donates Lab to Ghana through PEPFAR

By Dzid Enyonam Kwame, PEPFAR Media Specialist

GHANA - U.S. Defense Attache Lt. Col. Keith Blakely and Deputy Office of Security Cooperation Chief Lt. Col. John Van Steenburgh cut the ribbon with Commodore Sowa, Director General-Medical of the Ghana Armed Forces (GAF), on a newly donated laboratory facility in Takoradi in the Western Region.

The laboratory will assist the GAF in developing and implementing military-specific HIV prevention, care and treatment programs, including HIV testing and counseling, diagnosis and treatment of sexually transmitted infections, and screening for tuberculosis.

The U.S. Department of Defense HIV/AIDS Prevention Program (DHAPP) constructed and equipped the laboratory for use by the GAF. This collaboration between the U.S. Naval Medical Research Unit No. 3 ([NAMRU-3](#)) and the DHAPP is funded by the U.S. President's Emergency

Plan for AIDS Relief (PEPFAR).

The renovation initiative started in 2010 and transformed the former building into two laboratories, one for HIV/AIDS and the other for malaria. The facility intends to reach out to the large military community in the area, including active duty and retired military personnel (Navy, Air Force and Army) as well as civilian staff and family members living in Sekondi and Takoradi.

NAMRU-3 has engaged in numerous infectious disease surveillance efforts in collaboration with the GAF such as influenza surveillance, sexually transmitted disease surveillance, and acute febrile infections (AFI) surveillance, and will be initiating AFI surveillance at the Takoradi laboratory in the upcoming year.

With the laboratory established with the GAF, education and training of the support staff will pave the way for more sophisticated testing to be undertaken.

Through this project, the facility has been furnished with state-of-the-art

laboratory equipment, including a centrifuge, an analytical balance, a light microscope, a hot air oven, an incubator, an autoclave, and an overhead water tank with the capacity to store over 1,000 gallons of water and water heaters.

The PEPFAR program, implemented by the U.S. Agency for International Development, the U.S. Centers for Disease Control, the U.S. Department of Defense, the U.S. Department of State, and Peace Corps, has fought the devastating impact of HIV/AIDS in Ghana since 2007. PEPFAR, which directly funds the Government of Ghana's AIDS response, supported HIV counseling and testing for more than 86,000 people in 2012 alone and is currently working with 15 laboratories across the country to attain international accreditation. PEPFAR supports people living with HIV today in Ghana to empower them to take care of themselves, to help each other seek treatment, and to bring the message of prevention to others.

Greetings from the NMRC Ombudsman!

June is Men's Health Month! The Navy recognizes that part of operational readiness is having a fit fleet, hence the biannual physical fitness test standards. Being a good sailor, or for that matter, a husband or father, means staying healthy. If you aren't in the habit of doing so already, let this month be the month you start that regular exercise routine. You can also start looking at the impact your lifestyle choices have on your health, such as diet habits, smoking and alcohol use. While it is important for men and women alike to maintain an active and healthy lifestyle, this month is designed to focus our attention on health concerns specific to men such as prostate health. It is estimated that more than 30 million men suffer from prostate conditions that negatively affect their quality of life. Further, more than 50 percent of men in their 60s and as many as 90 percent of men 70 and older have symptoms of an enlarged prostate. Each year over 230,000 men will be diagnosed with prostate cancer and about 30,000 will die of it. If you are a man, when was the last time you had a physical? Are you due for a checkup and should a PSA (prostate-specific antigen) screening be part of that checkup? Below is a link to a quick reference guide for when and how often men should get health checkups and screenings, because regular screening and prevention are key to maintaining good physical wellness.

Men's Checkup Schedule: <http://www.menshealthnetwork.org/library/pdfs/GetItChecked.pdf>

Men's Health Month: <http://www.menshealthmonth.org/>

Prostate Health Guide: <http://www.prostatehealthguide.com/>

Remember, at one time or another, maybe even now, you may be looked upon as a role model to another sailor, a child, or someone else. Set an example and aim to meet your physical fitness potential today! A fit Navy is a strong Navy!

As always, if you are in search of other resources or assistance, please don't hesitate to contact me. I can be reached by phone at (301) 233-9789 or by email at NMRC.Ombudsman@gmail.com.

Have a Fine Navy Day!
Alexandra Mora, NMRC Ombudsman